



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: INFORMATION: Equivalent Level of Safety Finding
(ELOS) for Bombardier Aerospace Model BD-100-1A10
TC2500NY-T

Date: May 19, 2003

From: Manager, Transport Airplane Directorate,
Airplane & Flight Crew Interface, ANM-111

Reg Ref § 25.177(c)
Reply to Kevin Dowling
Attn. of: ANE-170

To: Manager, New York ACO

ELOS TC2500NY-T-F-2
Memo #

The purpose of this memorandum is to inform the certificate management certification office of an evaluation made by the Transport Airplane Directorate on the establishment of an equivalent level of safety finding for the Bombardier Aerospace model BD-100-1A10 Challenger 300.

Background

During steady heading sideslip maneuvers associated with determining compliance with 25.177(c) it was discovered that the BD-100-1A10 experiences a distinct, perceptible roll perturbation at a particular angle of sideslip. At angles of sideslip less or greater than the point at which this perturbation occurs, the lateral control movements and forces were substantially proportional, but at the point of the perturbation, a lateral control input is required to counter the change in rolling moment.

It was reasoned that an uncommanded roll during a sideslip maneuver does not meet the requirement for a substantially proportional relationship between angle of sideslip and aileron control movement and therefore does not meet the criteria specified in FAR 25.177(c).

Applicable Regulations

§ 25.177(c)

Regulation(s) Requiring an ELOS

§ 25.177(c)

Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations, or equipment needed for equivalency)

Bombardier Aerospace intends to provide an equivalent level of safety to the requirement of FAR § 25.177(c), based on an flight test evaluation, pertinent data review from steady heading sideslip tests, and other testing throughout the certification program. This data will be reviewed to show no unsafe condition exists as a result of the perturbation, and that all other static lateral directional stability characteristics meet certification requirements.

Qualitatively, the aircraft was shown to exhibit acceptable static lateral-directional characteristics during steady heading sideslip certification test points, medium level cross winds (15 kts, Takeoff and landings), minimum control speed testing, and single engine failure takeoff and landings.

At all conditions tested, the aircraft exhibited positive stability as evidence by the return to straight and level flight upon release of rudder and aileron control. The uncommanded roll did not require exceptional piloting skill, alertness, or strength and that aileron and rudder control forces were in harmony and in compliance with 25.143(d).

Quantitatively, cross plots of aileron and rudder controls forces and positions versus sideslip angle exhibited positive lateral and directional stability characteristics. The uncommanded roll showed a negligible effect on aileron control, position, and forces and did not compromise safe operation of the aircraft throughout the full sideslip range of the aircraft.

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

After review of the qualitative and quantitative findings it was determined that the lateral perturbation has a minor effect on proportionality of aileron and rudder control movements and forces. Furthermore, this occurs over a very limited range of sideslip angle and did not require exceptional piloting skill alertness or strength to counter. As such the aircraft is deemed to possess a level of safety equivalent to that of an aircraft without a lateral perturbation.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned Equivalent Level of Safety Finding addressed in issue paper F-2. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The Transport Airplane Directorate has assigned a unique ELOS Memorandum number to facilitate archiving and retrieval of this ELOS. This number should be listed in the Type Certificate Data Sheet in the Certification Basis section as a statement for a TC or ATC project or on page 3 of the STC for an STC project. An example of an appropriate statement is provided below.

Equivalent Safety Findings have been made for the following regulation(s):

§ 25.1203(a) Fire Detector System (documented in TAD ELOS Memo TC2500NY-T-P-3)

Gregory L Dunn

5/20/03

Manager, Transport Airplane Directorate,
Airplane & Flight Crew Interface, ANM-111

Date

ELOS Originated by New York ACO:	Project Engineer: Kevin Dowling	Routing Symbol ANE-170
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